UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

VOL. XVII. WASHINGTON CITY, AUGUST, 1889. No. 8.

INTRODUCTION.

This REVIEW is based on reports from 2,208 stations in the United States and Canada for August, 1889, comprising data received from regular and voluntary observers of both countries. These reports are classified as follows: 180 Signal Service stations; 117 monthly registers from United States Army post surgeons; 1,381 monthly registers from state weather service and voluntary observers; 24 Canadian stations; 171 stations through the Central Pacific Railway Company; 335 marine reports through the co-operation of the Hydrographic Office, United States Navy; marine reports through the "New York Herald Weather Service;" monthly weather reports from the local weather services of Arkansas, Colorado, Dakota, Illinois, Indiana, Iowa, the Iowa Weather Crop Bulletin Service, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Texas, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

CHARACTERISTICS OF THE WEATHER FOR AUGUST, 1889.

During August, 1889, six low pressure storms appeared within the region of observation over the North American continent, the average number traced for the corresponding month of the last fifteen years being nine and seven-tenths, and eight storms were traced over the north Atlantic Ocean. Severe local storms were most frequently reported in New York, Pennsylvania, Minnesota, and Kansas, and they were more generally noted on the 1st, 3d, 4th, 7th, 13th, and 14th. The most important storm of the month on the north Atlantic Ocean advanced northward off the coast of the United States between the thirtieth and fortieth parallels of latitude from the 25th to 27th, inclusive, attended at sea by gales of great violence. The disturbances in the Caribbean Sea and the Gulf of Mexico preceding the appearance of this storm did not, apparently, possess well-defined movements of translation. The Arctic ice reported did not differ materially in distribution and quantity from the average for the month, and the fog reported west of the fortieth meridian west of Greenwich about equalled the usual amount for August.

The mean temperature was lower than usual in the Atlantic coast states and thence westward south of the Great Lakes to the eastern slope of the Rocky Mountains, in the valley of the Columbia River, and at Los Angeles, Cal.; elsewhere the month was generally warmer than the average August. In districts where the mean temperature was below the average the departures were less than five degrees, while at stations in the British Possessions north of Montana the mean temperature was more than five degrees above the average August values. At Fort Assinniboine, Mont., the highest absolute temperature recorded for August during the period of observation was reported, while at Portland, Me., Jacksonville and Key West, Fla., the minimum temperature was lower than noted for the corresponding month of previous years. Killing frost occurred at Galena, Ill., on the 1st; at Grand Rapids, Wis., the night of the 4–5th, and at Linkville, Oregon, on the 19th.

The rainfall of the month was very irregularly distributed, and was greatest in areas in the Atlantic coast states, and in Nebraska, where it exceeded ten inches. Over a considerable portion of California and Nevada no rain fell, and in parts of Illinois, Indiana, Iowa, Michigan, and Pennsylvania the rainfall for the month was the least ever reported for August. Snow was reported at one place only, Greensburgh, Pa., on the 15th. Disastrous floods occurred in parts of Connecticut, New Jersey, Pennsylvania, Maryland, Virginia, Colorado, Missouri, and Nebraska, and damaging drought was reported in sections of Montana, Dakota, Missouri, Kansas, Utah, Texas, Iowa, Michigan, Minnesota, Illinois, and Ohio.

A well-defined auroral display was observed at Saint Vincent, Minn., on the night of the 28–29th; noteworthy solar halos were reported at three stations in New York on the 23d; and brilliant meteors were noted in Georgia on the 11th, in Texas on the 14th, and in Washington Territory on the 22d.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for August, 1889, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart ii by isobars. The difference between the mean pressure for August, obtained from observations taken twice daily at the hours named, and that determined from hourly observations varied at the stations named below as follows: At Washington, D. C., Philadelphia, Pa., New York, N. Y., Boston, Mass., Saint Louis, Mo., and Chicago, Ill., the mean of the 8 a. m. and 8. p. m. observations was higher by .011, .006, .006, .007, .001, and .003, respectively, than the true mean pressure.

The mean pressure for August, 1889, was highest within an area extending from the Atlantic coast between the twenty-eighth and thirty-eighth parallels to the Ohio Valley, where the values rose above 30.10, the highest mean readings, 30.14, being noted at Charlotte, N. C., and Knoxville, Tenn. In districts east of the ninety-seventh meridian and south of the latitude of Lake Superior, and on the Pacific coast north of the fortieth parallel, the mean pressure was above 30.00. The mean pressure was lowest within an area extending from the lower Colorado valley over southeastern California and southwestern Nevada, where the readings were below 29.80, the lowest mean values, 29.76 and 29.77, being noted at Yuma, Ariz., and Keeler, Cal., respectively. From this region northeastward over the middle and northern plateau regions and the northeastern slope of the Rocky Mountains the mean pressure was below 29.90, and fell below 29.85 in the British Possessions north of Montana.

A comparison of the pressure chart for August, 1889, with that of the preceding month shows that a general increase in pressure occurred east of the one hundredth meridian, save over the southern half of Florida, where there was a slight decrease, and along the immediate west Gulf coast, where the mean pressure was about the same. Over the western half of the country there was an increase in pressure in the middle and southern plateau regions, the middle, eastern, and southeastern slopes of the Rocky Mountains, and in the valley of the Columbia River and Oregon; while over Montana, and thence southwestward to and along the California coast, there was a slight decrease. The most marked increase in mean pressure occurred from the lower Missouri valley to New England, where it exceeded .10, and the greatest decrease in north-central Montana and the British Possessions to the northward, where it was more than .05. For July, 1889, the mean pressure rose to 30.10 at but one station, Jupiter, Fla., while for the current month this value was exceeded over a considerable area in the southeastern part of the country. Within the area of low pressure over the southern plateau region the mean values remained about the same.

Compared with the normal pressure for August the mean pressure for the current month was above the normal, except in the upper Missouri and Red River of the North valleys and thence westward over the northern plateau region, in California, southern Arizona, southern New Mexico, and southwestern Texas. The greatest departures above the normal occurred at stations in North and South Carolina, where they equalled or exceeded .10, and the most marked departures below the normal were noted in north-central Montana, extreme southwestern California, and southwestern Texas, where they were .05, or more. The departures above the normal pressure generally exceeded .05 east of the Mississippi River and south of the Lake region, while over the middle and southeastern slopes of the Rocky Mountains, the middle, and a portion of the southern, plateau region, and along the immediate north Pacific coast, they were less than .05.

BAROMETRIC RANGES.

The monthly barometric ranges at the several Signal Service stations are shown in the table of miscellaneous meteorological data. The general rule, to which the monthly barometric ranges over the United States are found to conform, is that they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In August, 1889, the ranges were greatest in the upper Missouri and Red River of the North valleys, where they exceeded .70. From this region they decreased eastward to New England, where they varied from .53 to .65; southeastward to the south Atlantic and east Gulf coasts, where they were less than .30; southward to the Rio Grande valley, where they fell below .20; southwestward to the south Pacific coast, where they ranged from .25 to .30; and westward to the north Pacific coast, where they amounted to .70 in northwestern Washington. Along the Atlantic coast the monthly ranges varied from .24, at Key West, Fla., to .65 at Albany, N. Y.; between the eighty-second and ninety-second meridians, .21 at Port Eads, La., to .67 at Sault de Ste. Marie, Mich.; between the Mississippi River and the Rocky Mountains, .19 at Brownsville, Tex., to .76 at Saint Vincent, Minn.; in the plateau and Rocky Mountain regions, .24 at Whipple Barracks (Prescott), Ariz., to .74 at Helena, Mont.; on the Pacific coast, .25 at San Diego, Cal., to .70 at Port Angeles, Wash.

AREAS OF HIGH PRESSURE.

Seven areas of high pressure were observed within the limits of the country during the month of August; three of which approached from the Pacific coast; two were first observed as they approached the stations from the regions north of Dakota; one was the continuation of the high area off the Atlantic coast at the end of July; and one approached the Saint Lawrence Valley from the direction of Hudson Bay.

The direction of movement of these areas while east of the Rocky Mountains was generally to the south of east; area number vii, however, moved somewhat to the northeast, apparently under the impulse of the tropical storm approaching along the Gulf Stream. After the disappearance of the storm its course was to the south.

Six of the areas observed disappeared off the south Atlantic coast and one disappeared by gradual decrease of pressure while central over the Rocky Mountain regions.

The following tables exhibit some of the more prominent characteristics of the high areas:

TABLE I.

No.	First observed.			Last observed.		Duration.	Velocity per hr.	Highest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Date.	Station.	Reading.
		°	°	°	°	*Days.*	*Miles.*			*Inches.*
I	1	45	63	27	80	4.0	13.0	1	Halifax, N.S.	30.24
II	1	52	113	38	100	2.0	.....	1	Calgary, N.W.T.	30.32
III	3	49	97	33	80	6.0	15.0	5	La Crosse, Wis.	30.34
IV	6	48	122	35	76	6.0	19.0	10	Saint Vincent, Minn.	30.30
V	14	48	97	30	82	6.0	12.0*	20	Knoxville, Tenn	30.28
VI	19	46	123	37	76	4.0	26.0	21	North Platte, Nebr	30.32
VII	24	47	75	37	81	6.0	14.0	27	Halifax, N.S	30.34
Mean.	....	48	99	34	82	4.8	16.5	....	.....	30.31

*This is the rate of progression till reaching the vicinity of the coast; its movement thereafter was much retarded.

TABLE II.

Number.	Maximum abnormal rise in pressure in twelve hours.			Maximum abnormal fall in temperature in twelve hours.			Maximum wind velocity.		
	Amount.	Station.	Date.	Amount.	Station.	Date.	Miles per hour.	Direction.	Date.
	Inch.			°					
I	.14	Baltimore, Md ... / Philadelphia, Pa.	4	12	Northfield, Vt	3	38	S.	1
II	.38	Denver, Colo	1	17	Medicine Hat, N.W.T.	1	36	SW.	2
III	.20	Fort Elliott, Tex.	4	12	Little Rock, Ark	4	44	NW.	4
IV	.30	Ft. Assinniboine, Mon	6	23	Qu'Appelle, N. W. T	6	38	N.	9
V	.30	La Crosse, Wis	14	18	Springfield, Mo	14	42	NW.	14
VI	.38	Valentine, Nebr. / North Platte, Nebr / Montrose, Colo.	20	26	Valentine, Nebr	20	42	NW.	20
VII	.20	Sault Ste. Marie, Mich	30	29	Qu'Appelle, N. W. T.	28	40	NE.	27

I.—This is a continuation of high area number ix of July. The centre of high lay apparently some distance off the coast, but the greater part of the country east of the Mississippi was embraced within its influence. Rains prevailed in the Atlantic and east Gulf states during the greater part of the time that these sections were embraced within the high area, the wind directions along the coast prevailing from the seaward. The course of this area during August was generally coincident with the coast line to the south. On the morning of the 2d it was central off the Carolina coast, with a maximum recorded pressure of 30.24. Thereafter, with gradually diminishing pressure, it slowly moved over Florida and disappeared off the east coast on the 5th. The most marked feature of this high was the rain-area which persistently attended.

II.—On the morning of the 1st this area was central to the northwest of Montana, but had extended southward as far as Colorado. It moved slowly to the southeast, the pressure diminishing and its definite character gradually disappearing, so that by the evening of the 2d it had merged with the high area off the Atlantic coast as an outlying ridge. It was attended by fresh to high northwesterly winds and considerable reduction in temperature in the early stages of its progress, otherwise no unusual conditions were developed, its disappearance by gradual decrease in pressure being attended by cool, fair weather.

III.—This area apparently moved over from the north Pacific coast. It made its appearence as a well-defined high at northern Minnesota stations on the evening of the 3d, causing the first frost of the month. It rapidly extended its influence

southward, attended by high winds in Kansas, Indian Territory, and northern Texas, and by an extensive rain-area in its southern quadrants. As its chilling effects reached the trough of low in its front occasional heavy rains were produced. By the 5th the area (then central over Wisconsin) had attained its maximum pressure, 30.34 inches. With a slight reduction from this maximum, the pressure thereafter remained fairly constant during the six days of the progress of the high across the country. Rain in varying quantities, heavy at times, fell in the Gulf and south Atlantic states while under the domination of this high. The area was generally well defined, and in the central portions clear, cool weather prevailed. In consequence of the formation of a low in its rear, high winds were produced in the wake of the high which, at one stage of its course, reached an hourly velocity of sixty miles. The gradient was slight, and no specially high velocities were generated in advance of the high. The course of this area was to the southeast till reaching southern Michigan, where it remained stationary for two days. It then resumed its progress, moving slightly to the north of east till reaching New England, after which it gradually settled southward, disappearing off the Carolina coast.

IV.—This area was first observed on the north Pacific coast, in which locality it remained for several days, with marked fluctuations in pressure. By the 9th it had moved over into Dakota, with a well-defined centre. Its path for the succeeding two days was somewhat erratic, the centre of greatest pressure on the morning of the 9th appearing in central Dakota, on the evening of the same date in southern Nebraska, the following morning in northern Minnesota, and during the next twelve hours again moving southward to Iowa. Thereafter its course was generally to the south of east, with a uniform rate of movement till reaching the North Carolina coast on the night of the 12th. After remaining in this locality for twelve hours longer it disappeared. During the entire progress of this area rains were observed in its southern quadrants, the rain-area at times being considerably extended, with occasional heavy precipitation in localities.

V.—This area also approached the stations from the Pacific. By the morning of the 14th it had progressed as far eastward as Minnesota, at which time a storm of considerable energy was central over the lower lakes, with a trough of low extending southwestward to northern Texas. As this storm moved off, the area of high pressure rapidly extended east and south, producing high winds in Nebraska, Kansas, Missouri, Arkansas, southern Illinois, and western Kentucky and Tennessee. Until the night of the 15th its course was to the south, and the high area extended from Lake Superior to the Gulf and from Kansas to Ohio. After some delay in the valley of the Mississippi it moved slowly eastward to the coast without decided change in pressure, its movement being greatly retarded as it approached the ocean. On the night of the 19th it was apparently central off the south Atlantic coast, but later reports showed it to have again moved inland with some increase in pressure. Its subsequent course was to the southeast over Florida, the morning report of the 21st showing a continuous ridge of high from this section to the Northwest in conjunction with the high area then central over the Rocky Mountain stations. In the earlier stages of its progress it was attended by an extensive rain-area to its southeast, which gradually gave place to clear weather as the area advanced.

VI.—It was possible to trace the progress of this area from the Pacific to the Atlantic. It definitely began its easterly movement on the 19th, but for thirty-six hours previous its position on the north Pacific coast could be approximately located. It moved to the southeast with considerable rapidity until reaching the eastern slope of the Rocky Mountains; here its progress was much delayed, the pressure somewhat diminishing but its area extending. It subsequently disappeared to the eastward, passing off the middle Atlantic coast. During the passage of this high area over the Rocky Mountain regions high wind velocities were developed in conjunction with the low area in its advance in Montana, Dakota, Kansas, and Nebraska, and a very considerable fall in temperature was recorded in these localities, the high velocities and falling temperature also preceding the high and following in the wake of the low in its passage over the Lakes.

VII.—This area first made its appearance over the Great Lakes on the morning of the 24th, having apparently approached the stations from the direction of James Bay. It rapidly extended its influence over sections to the east of the Mississippi with a tendency to move southward, but the morning report of the 25th showed, however, a considerable increase of pressure at northern stations, and a diminution at southern, due, apparently, to the approach of a tropical storm off the south Atlantic. The high area moved slowly to the eastward over New England, apparently serving as a buffer to the cyclone, after the passage of which its course was to the southward along the Atlantic coast. Before its final disappearance off Hatteras its pressure was considerably augmented.

At the time of the appearance of this high area rains fell in the Atlantic States from Maine to Florida, and continued until the approach of the cyclone. The high then assumed ascendency over the country north of Virginia, maintaining fair weather, notwithstanding the effects of the cyclonic disturbance were plainly visible in the continuous northeast gales which prevailed off the north Atlantic coast from the 25th to the 30th. The conditions during this period afford an interesting example of a dry northeaster.

AREAS OF LOW PRESSURE.

The following tables exhibit the principal facts regarding these low areas:

TABLE I.

No.	First observed.			Last observed.		Duration.	Velocity per hr.	Lowest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Date.	Station.	Reading.
		°	°	°	°	*Days.*	*Miles.*			*Inches.*
I.....	1	50	97	49	68	3.5	24.0	1	Port Arthur, Ont.....	29.70
II.....	4	50	110	50	60	6.0	20.0	5	Qu'Appelle, N. W. T....	29.62
III.....	11	51	108	48	76	4.6	25.0	14	Kingston, Ont.....	29.62
IV.....	16	53	112	50	89	2.0	22.0	16	Swift Current, N. W. T.	29.56
V.....	18	52	112	50	64	4.6	26.0	20	Port Arthur, Ont.....	29.44
VI.....	27	52	114	50	87	2.0	27.0	27	Qu'Appelle, N. W. T....	29.22
Mean.	....	51	109	50	74	3.8	24.0	....	.....	29.53

TABLE II.

Number.	Maximum abnormal fall in pressure in twelve hours.			Maximum abnormal rise in temperature in twelve hours.			Maximum wind velocity.		
	Amount.	Station.	Date.	Amount.	Station.	Date.	Miles per hour.	Direction.	Date.
	Inch.			°					
I.....	.18	La Crosse, Wis.....	1	6	Chicago, Ill.....	1	44	sw.	3
II.....	.24	Rockliffe, Ont.....	8	13	Rockliffe, Ont.....	8	60	w.	7
III...	.28	Halifax, N.S.....	15	5	Eastport, Me.....	15	56	sw.	11
IV...	.28	Saint Vincent, Minn.	19	14	Duluth, Minn.....	20	42	nw.	16
V....	.34	Fort Custer, Mont...	23	27	Medicine Hat, N.W.T	22	42	w.	20
VI...	.32	Qu'Appelle, N. W. T.	27	25	Fort Custer, Mont ..	26	52	w.	27

Six areas of low pressure were traced over the United States and the territory to the north during the month of August, and the first well-defined tropical storm of the season made its appearance off the Atlantic coast the latter part of this month.

Five of these low areas were first observed to the northwest of Montana; the other made its appearance north of Minnesota. In addition to these an extensive area of low pressure remained in the southern plateau region throughout the greater part of the month. The paths of all were to the north of the fortieth parallel, and the general direction of movement east of the ninety-seventh meridian was to the eastward. Two of the storms pursued a course but slightly to the east of south till reaching the eastern portion of Colorado, in which locality their movement was greatly retarded for twenty-four hours or

more, after which they took up courses to the northeast which they maintained till north of the line of lakes, thence they moved north of, and parallel to, the valley of the Saint Lawrence. Two of the storms disappeared to the north of the Lake region; three over the Saint Lawrence Valley; and one passed off the New Jersey coast and thence northeastward to Nova Scotia.

I.—On the morning of the 1st this area was central north of Minnesota, with high barometer immediately to the west, and a high area also to the eastward off the coast, which dominated the Atlantic states. This low area pursued a path somewhat to the south of east until the evening of the 2d, it then assumed a course to the northeastward over the Gulf of Saint Lawrence. Its progress was marked by no special features. The rain-area which attended extended southward to Missouri, the amount of precipitation increasing with the movement to the east, but at no time was it excessive until the conjunction of its rain-area with that prevailing in the Atlantic states. Prior to its disappearance to the northeast this low, which had produced but slight wind disturbance in its path, caused southeast velocities of short duration on the New England coast of from twenty to forty-four miles per hour.

II.—This area first appeared north of Montana on the evening of the 4th. It remained in this locality with but slight movement to the eastward until the evening of the 5th, the morning report of the 6th, however, shows the development of a trough extending from northern Dakota southwestward to Utah, with lowest pressure at Rapid City, Dak. Light local rains and high wind velocities over southern Dakota and Nebraska attended the formation of the trough of low pressure. The centre of low remained in practically the same locality until the night of the 7th, the disturbance meanwhile gathering intensity, the winds increasing, a velocity of sixty miles from the west being recorded at Valentine, Nebr., on the morning of the 7th. The rain-area, and amount of precipitation also, having increased. Morning reports of the 8th show the centre of low to have moved rapidly to the northeast over Lake Superior. In its passage north of the Lakes it was attended by occasional heavy rains in Iowa and Wisconsin, and at the time of its disappearance to the northeast the rain-area included New England and the Middle States, and the regions in the Ohio and lower Missouri valleys. This disturbance caused no storm velocities on the Atlantic coast, but high winds prevailed on Lake Ontario during the passage of the centre north of this lake, the winds having apparently increased in force after shifting to the west.

III.—This area appeared to the north of Montana on the evening of the 11th. The barometer throughout the country east of the Rocky Mountains was above the normal at this time, except in the extreme eastern portion of New England, the centre of high barometer being in Ohio. Unusually high wind velocities in the Rocky Mountain districts, with widespread but light rainfalls, marked the appearance of this low, which by the morning of the 13th had moved down over southern Minnesota as a well-defined storm. At this time the light rains had extended over the Lake region eastward to New England, while in the Mississippi Valley occasional heavy rainfalls were reported from Lake Superior to Missouri. The storm gradually gathered intensity in its path to the eastward, the rain-area by the next morning embraced the whole country east of the Mississippi, the storm was defined by the circumscribing isobar of 29.80 inches, the barometric gradient indicated high winds, and it was evident that its progress to the Atlantic coast would be attended by considerable disturbance. The evening report of the 14th showed the storm-centre well defined over the eastern end of Lake Ontario, but the succeeding report revealed that the storm had resolved itself into two distinct disturbances, one of which, moving to the northeast, was central over Montreal, the other, to the southeast, off the New Jersey coast; thereafter these separate storms pursued distinct paths, the general course of both being to the northeast, the New Jersey storm skirting the coast.

IV.—This area was indicated by reports from the regions north of Montana on the evening of the 14th. By the evening of the 25th it had somewhat extended its influence southward, producing light rains and high winds in Colorado. Its general course was to the eastward, the centre of low at no time appearing within the limits of the United States, although its position could be located with much certainty from the character of the isobars. In addition to the precipitation in Colorado, light rains were also caused in northern Dakota and northern Minnesota. High winds were reported in eastern Dakota and western Minnesota on the 17th, but, during the passage of this low to the north of the Lakes, light winds as a rule prevailed. This area disappeared on the 18th to the north of the Lake region.

V.—This area appeared over Montana on the morning of the 18th. It rapidly moved down into northeastern Wyoming and southwestern Dakota, causing high westerly winds with light rain in Wyoming and Colorado, and high easterly winds with rain in Dakota. By the evening of the 19th the rain-area was widespread over the northern Rocky Mountains, the storm having recurved in northwestern Nebraska and slowly taken up a movement to the northeast. During its movement in this direction, high velocities were reported in Dakota, Minnesota, Kansas, Nebraska, and Iowa, and heavy rainfall at Duluth and Saint Paul, Minn., with a widespread area of precipitation attending. On the evening of the 20th the storm was central over Lake Superior, the barometer recording a pressure of 29.44 inches at Port Arthur., Ont., with a steep gradient to the west, producing high westerly winds. During the movement of the storm eastward from this locality storm velocities were generated at a number of the stations on the Lakes. The low area disappeared on the 22d over the Saint Lawrence Valley without having produced high wind on the north Atlantic.

VI.—This area appeared to the northwest of Montana on the evening of the 25th; at this time light rains prevailed in Wyoming and Colorado, which, however, soon gave place to fair weather. Occasional high winds occurred to the south of the low, which, although the centre remained practically stationary, was gradually extending southward, so that by the morning of the 27th the pressure in the upper Missouri valley and northern plateau regions was considerably below the normal. The course of the low was but slightly to the south of east, the centre remaining at all times without the United States. It disappeared when north of Lake Superior. In its advance eastward there was considerable crowding of isobars, and high winds prevailed in the southern quadrants. This low was remarkable for the general absence of precipitation within the region of its influence, notwithstanding its decided character, the barometer reading 29.20 inches on the evening of the 27th when central north of eastern Montana, and the temperature standing very considerably above the normal.

NORTH ATLANTIC STORMS FOR AUGUST, 1889 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during August, 1889, are shown on chart i. These paths have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Eight depressions have been traced for August, 1889; the average number traced for the corresponding month of the last six years being nine. Of the depressions traced for the